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SENNIGER POWERS LLP
100 NORTH BROADWAY
17TH FLOOR
ST LOUIS, MO 63102

EXAMINER	
CALANDRA, ANTHONY J	
ART UNIT	**PAPER NUMBER**
1791	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

uspatents@senniger.com

Office Action Summary	**Application No.** 10/564,881	**Applicant(s)** JAWAID, ABRAR	
	Examiner ANTHONY J. CALANDRA	**Art Unit** 1791	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE _3_ MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on _05 August 2009_.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) _23-40 and 42_ is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) _23-40 and 42_ is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application

6) ☐ Other: _____.

Detailed Office Action

The communication dated has been entered and fully considered.

Claims 23 and 42 have been amended. Claims 1-22, 41, 43, and 45 are canceled. Claims 23-40 and 42 are pending. Claim 44 has the claim identifier 'canceled' but is still written out. The examiner has treated it as not canceled.

Response to Arguments

The examiner has withdrawn the rejections towards DANNENHAUER.

Applicant argues that AKHTAR and MICHANICKL are non-analogous arts.

Applicant argues that is AKHTAR is not helpful for the purpose of getting low lignin contaminated fibers. Applicant argues that AKHTAR is seeking to free cellulosic fibers with little to no lignin. Applicant points to the examiners argument stating 'breaking the lignin' that the fibers are different from the applicants.

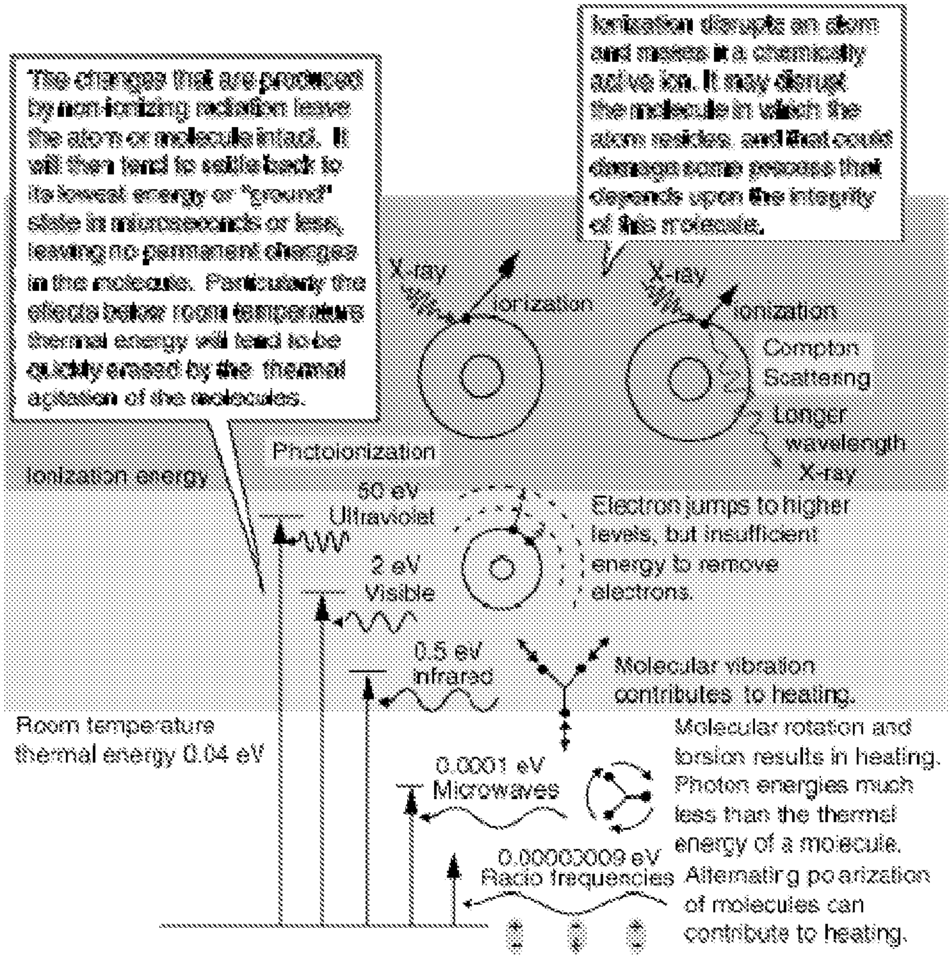
Fibers in wood contain a matrix of cellulose, hemicellulose, and lignin. These fibers are bound together by lignin. Mechanical pulping separates the fibers, still containing lignin, by breaking the lignin bonds between fibers. Mechanical pulps in strong direct contrast to the applicant's arguments contain *high* amounts of lignin [see e.g. SMOOK table 4-7 yields of 90-95%].

Applicant then argues that "fibres, not the in-tact lignocellulosic fibres from the MDF. And if RMP is not employed, one of the other thermomechanical, biological, chemical, or enzymatic processes described by Akhtar must be used. "

Mechanical pulping processes, including TMP (thermomechanical pulping), are used to make MDF fibers as evidenced by *Thermomechanical and chemo-thermomechanical pulps (CTMP) for medium density fiberboards* by ROFFAEL {abstract}. Therefore the fibers liberated by way of AKHTAR (with differing refining levels) are used for MDF. Therefore the fibers of AKHTAR are much closer then the applicant argues.

Applicant argues that one skilled in the art would not look to AKHTAR for electromagnetic radiation partially hydrolyzing the adhesive.

Microwave and radio wave radiation are non-ionizing radiation. The only effect microwave/radio wave radiation has upon chemical structures is *thermal*.



MICHANICKL soaks the MDF and heats it thus hydrolyzing it [Figure 2]. MICHANICKL shows increasing temperature increases hydrolyzing reactions [column 3 lines 3-5]. AKHTAR gives strong teachings to the effect of microwaves on heating such as temperature increase vs. time and temperature effects of microwaves vs. depth [Figure 2]. Therefore AKHTAR is additionally useful for heating effects of microwaves on lignocelluloses and the simple substitution of one thermal method for another thermal heating method.

Applicant argues that the microwave induction preheating of JP005 and RUSSELL is stated to facilitate impregnation of treating solution into a material and does not correlate to swelling or hydrolysis of adhesive which are the goals of the applicant's microwaving. Applicant distinguishes impregnation from swelling.

The increase of temperature due to microwaving correlates with hydrolysis and swelling. The effect of microwaves on molecules is thermal, see above. MICHANICKL states that by heating the derived timber products prior to immersing said products in the solution, swelling or impregnation is increased [column 4 lines 18-20 and column 4 lines 1-5 and figure 2 MICHANICKL equates swelling and impregnating]. Therefore the person of ordinary skill in the art would expect the microwave heating to increase both impregnation and swelling effects, since it is the thermal effects/heating of microwaves which increases swelling.

Applicant argues that neither RUSSELL nor JP005 teach MDF but instead teach impregnation of items such as glass fibers, plywood (a layers of wood bonded by glue), veneer, regenerated cellulose fibers, and carbon fibers.

The fact that RUSSELL and JP005 teach that impregnation is increased for many different compositions such as glass fibers as compared to cellulose fibers would give the person of ordinary skill in the art a teaching that microwaving increases impregnation for

many types of products. MDF is a product composed of lignocellulose fibers and glue. It would be expected that if a product as different as glass fibers had its impregnation increased that MDF impregnation would also increase because far more similar materials such as plywood (thin layers of wood bound by glue) have their impregnation increased.

Again the increase in impregnation is expected due to temperature increase. An increase in temperature increases mass transfer via diffusion {Fick's Law diffusion flux is proportional to temperature}.

Applicant argues that the treatment of 1.5 minutes is not generally urged by AKHTAR and uses a power of 50 kW which is 60% greater then the maximum level of instant claim 42. Applicant argues that power level is not a result effective variable.

Instant claim 42 discloses a power of 50 kW; however the total amount of wood being treated is not claimed (kW/unit of weight). A higher amount of power supplied would be required for a larger amount mass. A ton of MDF will require a much higher amount of kW than a pound of MDF to obtain the same amount of treatment.
AKHTAR shows that power applied is a result effective variable. Specifically increasing power increases temperature [Figure 2].

In summary:

- MICHANICKL teaches a method of recovering fibers from MDF [see e.g. column 5 lines 44-47].
- MICHANICKL teaches heat treatment prior to immersion [col. 4 lines 17-20] or heat treatment after immersion [Figure 2].
- MICHANICKL states that this causes impregnation and swelling [Figure 2]
- MICHANICKL states that this causes chemical hydrolysis [Figure 2].
- AKHTAR teaches a method of heating using microwaves and suggests that heating increases impregnation in wood.
- Microwaves and radio waves are non-ionizing radiation and only have thermal effects. Microwaves themselves do not directly cause hydrolysis. The thermal effects of heating cause hydrolysis.
- Both RUSSELL and JP005 confirm that it is known to use microwaves to increase impregnation in a multitude of substances. This is expected by first principles because increasing temperature increases mass transfer. RUSSELL further discloses "*that the process may be applied in the case of almost any material to* ***almost any solid dielectric material*** *in which it is desirable to penetrate the liquid* [column 3 lines 28-30]".
- The substitution of microwave heating of AKHTAR for heating of MICHANICKL would be obvious at the time of the invention. AKHTAR, RUSSELL, and JP005 all confirm that microwave heating increases impregnation.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

1. Claims 23, 24, 27-39, 42 and 44 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent 5,804,035 MICHANICKL et al., hereinafter MICHANICKL et al. in view of WIPO publication WO 03/040462 AKHTAR et al., hereinafter AKHTAR et al, and, if necessary, JP 58219005A, hereinafter JP005, or, if necessary, U.S. Patent 3,092,536 RUSSELL, hereinafter RUSSELL.

As for claim 23, MICHANICKL et al. discloses a method where a board material that is composed of adhesively bonded components has a constituent of it recovered (*A method of recovering a constituent of a composite board material comprised of a matrix of adhesively bonded lignocellulosic elements* [see e.g. abstract]). MICHANICKL et al. discloses soaking (swelling) the material in impregnation liquor (*swelling the material by*

subjecting the material to a soaking or immersion in a liquid medium [see e.g. Figure 1 and column 6 lines 25-30]). MICHANICKL et al. teaches that the recovered chips and fibers can be recovered and reused to make new fiberboard (*recovering the constituent* [see e.g. column 7 lines 30-35]). MICHANICKL discloses medium density fiberboard and chip board (*wherein the composite board material is medium density fibreboard (MDF) comprising a matrix of the lignocellulosic elements which are in the form of lignocellulosic fibres bonded together by means of adhesive* [column 5 line 45]). MICHANICKL discloses hydrolysis via chemical interactions and heating (wherein the generated electromagnetic radiation at least partially hydrolyses the adhesive and in combination with said soaking or immersion facilitates swelling of the board material [Figure 2]). MICHANICKL et al. discloses that impregnation vessel contains a stirring device [see e.g. column 9 line 21]. Examiner has interpreted the stirring device as a mechanical agitator which breaks the fiber board into a solution of chips, fibers, veneer, and other undesired components (*mechanically agitating the treated board material in the liquid medium to separate said lignocellulosic fibres from each other to yield a dispersion of said lignocellulosic fibres* [see e.g. column 9 lines 45-48]).

MICHANICKL et al. further discloses that full disintegration requires an impregnation of at least 80% treatment chemical and that the impregnation speed can be increased by vacuum treatment, pressure treatment, or heating the impregnation solution [see e.g. column 5 lines 8-17]. MICHANICKL et al. however does not disclose using electromagnetic radiation to help with disintegration or increase the impregnation rate.

AKHTAR et al. teaches a process for treating wood logs which are going to be pulped mechanically or chemi-mechanically [see e.g. abstract and paragraph 0040]. In

AKHTAR, the logs are first exposed to a electromagnetic radiation, microwaves, at 915 MHz, (*electromagnetic radiation and wherein the electromagnetic radiation has a frequency in the range of from 896 + 20 MHz to 2450 + 25 MHz or a frequency in the range of from 100 kHz to 100 MHz* [see e.g. paragraph 0054 and 0055]) and then treated in a further pulping process. At the time of the invention it would have been obvious to pre-treat the board material of MICHANICKL et al. with the microwave radiation of AKHTAR et al. A person of ordinary skill in the art would have been motivated to do so since microwave radiation increases the porosity and permeability of fibers by breaking pit membranes and vessel ends [see e.g. AKHTAR paragraph 0038]. This increase in permeability leads lower chemical uses [see e.g. AKHTAR paragraph 0038]. Similarly, the fibers and chips in the board material would also increase in permeability and porosity allowing higher impregnation and impregnation rate as desired by MICHANICKL et al. Additionally, it is *prima facie* obvious to substitute one thermal heating source for another thermal heating source. In the instant case thermal heating of MICHANICKL is substituted by the microwave induced thermal heating of AKHTAR. The person of ordinary skill in the art would expect success because AKHTAR shows that microwaves heat lignocellulose materials.

Additionally, a person of ordinary skill in the art would be expect that microwave/radio wave pretreatment would increase impregnation of a composite board material by both JP005 and RUSSELL. In RUSSELL it is disclosed that it is disclosed that radio waves can increase the depth of and speed of impregnation [column 3 lines 3-8]. RUSSELL further discloses "*that the process may be applied in the case of almost any material to* ***almost any solid dielectric material*** *in which it is desirable to penetrate*

the liquid [column 3 lines 28-30]". RUSSELL while not disclosing composite board discloses glass fibers, asbestos [30-32] which are two materials that are far more different from wood then a composite wood material. JP005 also describes dielectric/induction heating facilitates impregnation and shortens impregnation time [Derwent summary paragraph 1]. JP005 discloses multiple materials including wood and composite wood material such as plywood (thin layers of wood glued together to form a board material) [Derwent summary paragraph 2].

Therefore at the time of the invention a person of ordinary skill in the art would be further motivated to apply the known technology of dielectric heating (microwave/radio wave) of AKHTAR to the composite material of MICHANICKL to increase impregnation. A person of ordinary skill in the art would expect dielectric heating to work on dielectric material including composite wood based materials as suggested by both RUSSELL and 'JP005.

The examiner would finally like to point out the KSR decision in which known work in one field of endeavor may prompt variations of it for use in either the same field or a different based on design incentives, if the variations are predictable to one of ordinary skill in the art. In the instant case microwave pretreatment improves impregnation which is a design incentive. A person of ordinary skill in the art would expect success for applying microwaving to composite boards by JP005 and RUSSELL who disclose that microwaving improves impregnation for a wide range of materials.

As for claim 24, AKHTAR et al. teaches the use of microwave radiation and uses a generator that generates 915 MHz microwave radiation which falls within the instant claimed range [see e.g. paragraph 0054].

As for claim 27, AKHTAR et al. discloses multiple power ranges for the microwave radiation treatment including 10 kW and 20 kW which fall within the instant claimed ranges [see e.g. Figure 7]. Power is a result effective variable that affects the amount of heating.

As for claim 28 and 29, MICHANICKL et al. discloses that the impregnating solution consists of water, urea, and lye [see e.g. column 7 lines 1-5 and column 6 lines 25-30]. Water is a polar solvent.

As for claim 30, AKHTAR et al. discloses that the microwave pretreatment occurs before impregnation as this allows for increased porosity for chemical treatment before refining [see e.g. paragraphs 0038- 0040]. MICHANICKL suggests heating prior to immersion improves impregnation. Microwave induction is a type of heating.

As for claim 31 and 32, MICHANICKL et al. discloses that the impregnation treatment takes place at the elevated temperature of 80-120 degrees Celsius, which overlaps with the instant claimed range [see e.g. column 3 lines 1-6].

As for claim 33, AKHTAR et al. discloses that the electromagnetic microwave pretreatment occurs before impregnation [see e.g. paragraphs 0038- 0040] and does not disclose having the microwave pretreatment and impregnation occur simultaneously. MICHANICKL et al. discloses that the impregnation can be sped up by heating of the impregnation solution. Examiner notes that microwaving will in addition to opening the pores of the fibers, would also additionally heat the impregnation solution. Therefore, it would be *prima facie* obvious to submerse and expose the board material to microwave radiation simultaneously.

As for claim 34, MICHANICKL et al. discloses that impregnation vessel contains a stirring device [see e.g. column 9 line 21]. Examiner has interpreted the stirring device as a mechanical agitator which breaks the fiber board into a solution of chips, fibers, veneer, and other undesired components [see e.g. column 9 lines 45-48].

As for claim 35 and 36, MICHANICKL et al. disclose that the chips and fibers are removed and transferred to a reprocessing plant. Chips and fines are lignocelluloses. Further MICHANICKL et al. disclose that the recovered chips and fibers can be reprocessed into chip board or fiber board, both processes of which require drying [see e.g. column 7 lines 30-35].

As for claims 37 and 38, MICHANICKL et al. discloses that the process may be used on medium density fiber boards [see e.g. column 5 lines 44-47].

As for claim 39, AKHTAR et al. discloses that the electromagnetic radiation used is microwave radiation [see e.g. abstract].

As for claims 42 and 44, MICHANICKL et al. and AKHTAR disclose the features as per claim 23 above. MICHANICKL et al. discloses soaking (swelling) the material in impregnation liquor at the overlapping temperature of 80 to 120 degrees C (*swelling the material by subjecting the material to a soaking or immersion in a liquid medium at a temperature of 60 C to 90 C* [see e.g. Figure 1 and column 6 lines 25-30 and column 3 lines 3-6]).

AKHTAR discloses that the microwave radiation treatment can last from a 90 seconds to 6 minutes and does not disclose the instant claimed range of 30 to 90 seconds [see e.g. Figure 7]. However, at the time of the invention it would have been obvious to a person of ordinary skill in the art to optimize the amount of time that the board material

was exposed microwaves to depending on the total mass of the board, moisture content, board temperature, and how easily the board is breaking up in further treatments in order to adjust the total energy exposure [see e.g. MPEP 2144.05 II B]. The time of the microwaving is a result effective variable which determines how much heat is absorbed by the board.

Neither, MICHANICKL et al. nor AKHTAR gives any direct guidance to the time between microwave treatment and impregnation. However, a short time between microwaving and soaking would be expected as there are no disclosed intervening steps between the microwave and impregnation step. Further, MICHANICKL discloses that heating is important [see e.g. column 5 lines 10-17] and letting the board sit after microwaving would waste heat. Therefore sending the microwave treated board within 5 to 15 seconds to the immersion bath would have been obvious to a person of ordinary skill in the art.

RUSSELL and JP005 further support the rejection as per above in instant claim 23.

2. Claims 25, 26 and 40 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent 5,804,035 MICHANICKL et al., hereinafter MICHANICKL et al. in view of WIPO publication WO 03/040462 AKHTAR et al., hereinafter AKHTAR et al. and if necessary, JP 58219005A, hereinafter JP005, or, if necessary, U.S. Patent 3,092,536 RUSSELL, hereinafter RUSSELL, as applied to claims 23, 24, 27-39, 41, 42, 44, and 45 above, and further in view of U.S. Patent 4,000,032 BERSTROM et al, hereinafter BERSTROM et al.

As for claim 25, AKHTAR disclose that microwave radiation can be used as a pre-treatment for lignocellulosic fibers. AKHTAR only discloses the single frequency of 915 MHz [see e.g. paragraph 0054] and does not disclose the frequency of 2450 MHz. BERGSTROM et al. discloses the specific frequency of 2450 MHz [see e.g. column 5 line 52]. At the time of the invention it would have been obvious to a person of ordinary skill in the art to substitute the 2450 MHz wave of BERGSTROM et al. for the 915 MHz wave of MICHANICKL et al. and AKHTAR et al. A person of ordinary skill in the art would reasonably expect that both frequency waves to heat up the board material and open up the pores of the fibers to allow greater impregnation. Examiner further notes as stated in the specification that 915 and 2450 MHz are both the reserved frequencies for industrial/domestic use [see e.g. pg. 5] and it would have been obvious to try one of a finite number of available industrial microwave types.

As for claim 26 and 40, neither MICHANICKL et al. nor AKHTAR et al. disclose using radio waves to pre-treat lignocellulosic materials before impregnation. BERGSTROM et al. discloses that a wide range of frequencies can be used to irradiate lignocellulosic materials from 10 MHz to 300,000 MHz [see e.g. column 3 lines 53-55]. At the time of the invention it would have been obvious to a person of ordinary skill in the art to substitute radio waves of BERGSTROM et al. for the microwave pretreatment of MICHANICKL et al. and AKHTAR et al. A person of ordinary skill in the art would reasonably expect that both radio waves would heat up and increase the permeability of the board materials of MICHANICKL et al. in similar fashion as the microwaves of AKHTAR et al.

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to ANTHONY J. CALANDRA whose telephone number is (571) 270-5124. The examiner can normally be reached on Monday through Thursday, 7:30 AM-5:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Steven Griffin can be reached on (571) 272-1189. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Anthony J Calandra/
Examiner, Art Unit 1791

/Eric Hug/
Primary Examiner, Art Unit 1791